

### **REMARKS**

Applicants appreciate the continued examination of the present application as evidenced by the Office Action mailed June 17, 2008 (the "Action").

#### **Status of the Claims**

Claims 1, 4-6, 8, and 13 stand rejected under 35 U.S.C. 102(b) as anticipated by or, in the alternative, under 35 U.S.C. 103(a) as obvious over U.S. Patent No. 4,582,637 to Kirkham (hereinafter "Kirkham"). Claims 3, 7, and 9-12 stand rejected under 35 U.S.C. 103(a) as being unpatentable over Kirkham in view of U.S. Patent No. 4,416,810 to Noakes (hereinafter "Noakes"). Claims 1, 4-6, 8 and 13 stand rejected under 35 U.S.C. 102(b) as anticipated by or, in the alternative, under 35 U.S.C. 103(a) as obvious over U.S. Patent No. 5,946,639 to Hess (hereinafter "Hess"). Claims 3, 7 and 9-12 stand rejected under 35 U.S.C. 103(a) as being unpatentable over Hess in view of Noakes.

Claims 14-18 are new. Support for Claims 14-18 can be found, for example, in the Specification, on page 1, lines 6-7; page 3, lines 1-4 and page 5, lines 1-6.

Reconsideration is respectfully requested in view of the amendments above and the remarks that follow. A Request for Continued Examination is filed concurrently herewith.

#### **The Rejections under Sections 102 and 103**

Applicants submit that Claims 1, 4-6, 8, and 13 are patentable over Kirkham alone or in combination with Noakes and Hess for at least the reasons discussed in Applicants' paper submitted March 13, 2008. The discussion of Claims 1, 4-6, 8, and 13 in Applicants' paper submitted March 13, 2008 are hereby incorporated by reference.

In addition, it is noted that Kirkham is concerned with the encapsulation of liquid effluent wastes arising from the treatment of waste Magnox, which is a magnesium alloy (typically containing over 99% of magnesium and is used as a fuel cladding for metallic uranium fuel rods). For example, at column 1, lines 22-56, Kirkham discusses that the treatment process requires the treatment of intermediate level waste so as to produce a floc or suspension of precipitate that retains radioactivity. Magnox cladding is removed from the fuel rods by a mechanical process and/or it falls away from the fuel rods over time due to

corrosion of the cladding which occurs in the aqueous storage ponds in which the materials are typically stored after use. The materials generally become covered with magnesium corrosion products, such as magnesium hydroxide, as well as fully corroded Magnox, which mainly includes magnesium hydroxide, sometimes as a powder, but more frequently in the form of an aqueous sludge. The powder or sludge is then treated by washing and flocculation, which includes the addition of various other reagents prior to its eventual encapsulation in a cementitious or bituminous composition.

In contrast to Kirkham, embodiments of the current invention can be used to encapsulate un-reprocessed nuclear material, such as uranium metal, Magnox fuel elements or fuel element debris, such as whole rods or significant pieces of rods including uranium metallic fuel. Applicants submit that there is a significant difference between radioactive effluent arising from the reprocessing of irradiated Magnox fuel (as in Kirkham) and the Magnox fuel elements as recited in the current claims. In particular, Applicants submit that the waste effluent described by Kirkham would not be expected to contain uranium except in insignificant, trace quantities.

Accordingly, Applicants submit that Kirkham does not disclose or render obvious that the nuclear material includes uranium metal, Magnox fuel elements, and/or fuel element debris as recited in independent Claims 1 and 13.

Moreover, Hess also does not disclose or render obvious that the nuclear material includes uranium metal, Magnox fuel elements, and/or fuel element debris as recited in Claims 1 and 13. Hess proposes a method for treating ignitable cutting swarf, which involves collecting swarf in a casting mold underwater and injecting a binder mixture comprising vinyl ester styrene into the vessel to fill void volume, thereby forming a mixture comprising swarf and vinyl ester styrene, and then curing the mixture. *See Abstract*. Hess states that the technique is especially useful for stabilizing the ignitable characteristics of radioactive zirconium cutting swarf, and can be used to solidify zirconium swarf – or other ignitable finely divided material – underwater, but can also be performed out of water with other particulate wastes. *See id.*

It is noted, however, that the encapsulant which is used by Hess contains an organic polymer whereas independent Claims 1 and 13 recite that the encapsulant is a cementitious

material. In some embodiments according to the present invention, in order to maximize product quality and ensure the suitability of the encapsulated products for long term storage and eventual disposal, efforts are made to minimize the quantities of organic materials in the encapsulated products, since such organic materials and, more particularly, their breakdown products, tend to increase the leachability of radioactive species in the monoliths which are produced, and thereby compromise their effectiveness. Hess even comments that it is preferred that the claimed invention does not use cement (column 4, lines 38-39). Thus, Hess appears to teach away from the current invention. Accordingly, Applicants respectfully submit that recitations of Claims 1 and 13 are thus nonobvious in view of this aspect of Hess.

The missing elements of Kirkham and Hess are not supplied by Noakes. In particular, Noakes is directed towards a method for the encapsulation in a cement mixture of organic liquid radioactive waste which comprises an aromatic liquid and an organic fluor, and is generated from the use of liquid scintillation counting techniques. Applicants submit that this liquid radioactive waste is a completely different material from the significantly more radioactive uranium metal, Magnox fuel elements or fuel element debris which are recited in the independent claims, and that the problems addressed when considering the potential encapsulation of the different materials would, therefore, be entirely different.

Accordingly, Applicants request that the recitations of Claims 1, 4-6, 8 and 13 are not anticipated or rendered obvious by the cited prior art, and Applicants request that the rejections under 35 U.S.C. 102/103 be withdrawn.

#### **New Claims 14-18**

New independent Claim 14 recites that nuclear material comprises uranium metal fuel elements, Magnox fuel elements, and/or fuel element debris. Claim 15 depends from Claim 14 and recites that the nuclear material comprises a fuel element. Claim 16 depends from Claim 14 and recites that the nuclear material is treated with the encapsulant without reprocessing of the nuclear material.

Claim 17 depends from Claim 13 and recites that the nuclear material comprises uranium metal fuel elements, Magnox fuel elements, and/or fuel element debris. Claim 18 depends from Claim 13 and recites that the nuclear material comprises a fuel element.

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As discussed above, Kirkham is directed to the encapsulation of a radioactive floc or suspension of precipitates arising from the reprocessing of Magnox. *See* col. 1, lines 64-66. Hess discusses treating small quantities of swarf as the swarf is being cut to enhance the fire safety of the cutting operation. *See* col. 5, lines 62-65. Accordingly, Applicants submit that the above-emphasized recitations of Claims 14-18 are not disclosed or rendered obvious by the cited prior art.

Accordingly, Applicants submit that Claims 14-18 are patentable and request an indication of same.

### CONCLUSION

In light of the above amendments and remarks, Applicants respectfully submit that the above-entitled application is now in condition for allowance. Favorable reconsideration of this application, as amended, is respectfully requested. If, in the opinion of the Examiner, a telephonic conference would expedite the examination of this matter, the Examiner is invited to call the undersigned attorney at (919) 854-1400.

Respectfully submitted,



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### CERTIFICATION OF TRANSMISSION

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Joyce Paoli